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A CMOS silicon hole spin qubit[1] ROMAIN MAURAND, XAVIER JEHL, DHARAMJ KOTEKAR-PATIL, ANDREA CORNA, ALESSANDRO CRIPPA, HEORHII BOHUSLAVSKYI, CEA, INAC-PHELIQS, ROMAIN LAVIVILLE, LOUIS HUTIN, SYLVAIN BARRAUD, MAUD VINET, CEA, LETI, MARC SANQUER, SILVANO DE FRANCESCHI, CEA, INAC-PHELIQS — Hole spins in silicon represent a promising direction for solid-state quantum computation, possibly combining fast qubits [1] with limited hyperfine interaction. We report on a qubit device implemented on a foundry-compatible Si CMOS platform [2]. The device, fabricated using SOI NanoWire MOSFET technology, is in essence a two-gate pFET. The qubit is encoded in the spin degree of freedom of a hole quantum dot defined by one of the gates, while the second gate defines another quantum dot used for the qubit initialization and readout. All electrical, two-axis control of the spin qubit is achieved by applying a phase-tunable microwave modulation to one of the gate. We demonstrate fast coherent oscillations with Rabi frequencies as high as 80MHz with an inhomogeneous dephasing time of T_2^* ~60ns [3]. By demonstrating a hole spin qubit functionality in a conventional transistor-like layout and process flow, this result bears relevance for the future up-scaling of qubit architectures. [1]- Voisin, B. *et al.* *Nano Lett.* **16,** 88–92 (2016). [2]- Hutin, L. *et al.* *IEEE Symp. VLSI Technol.* 1–2 (2016). [3]- Maurand, R. *et al.* *Arxiv Prepr. arXiv1605.07599v1* (2016).

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